

## **Supplementary Information**

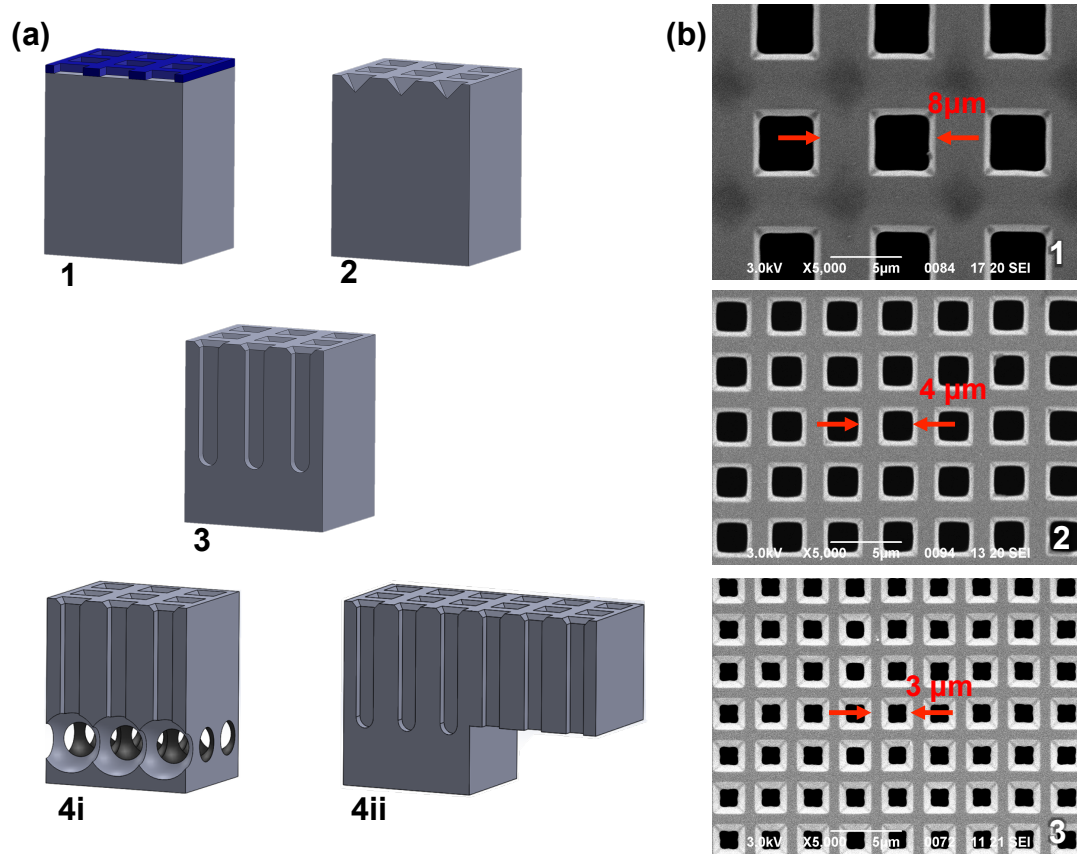
### **Template-Assisted Preparation of Micrometric Suspended Membrane Lattices of Photoluminescent and Non-Photoluminescent Polymers by Capillarity-Driven Solvent Evaporation: Application to Microtagging**

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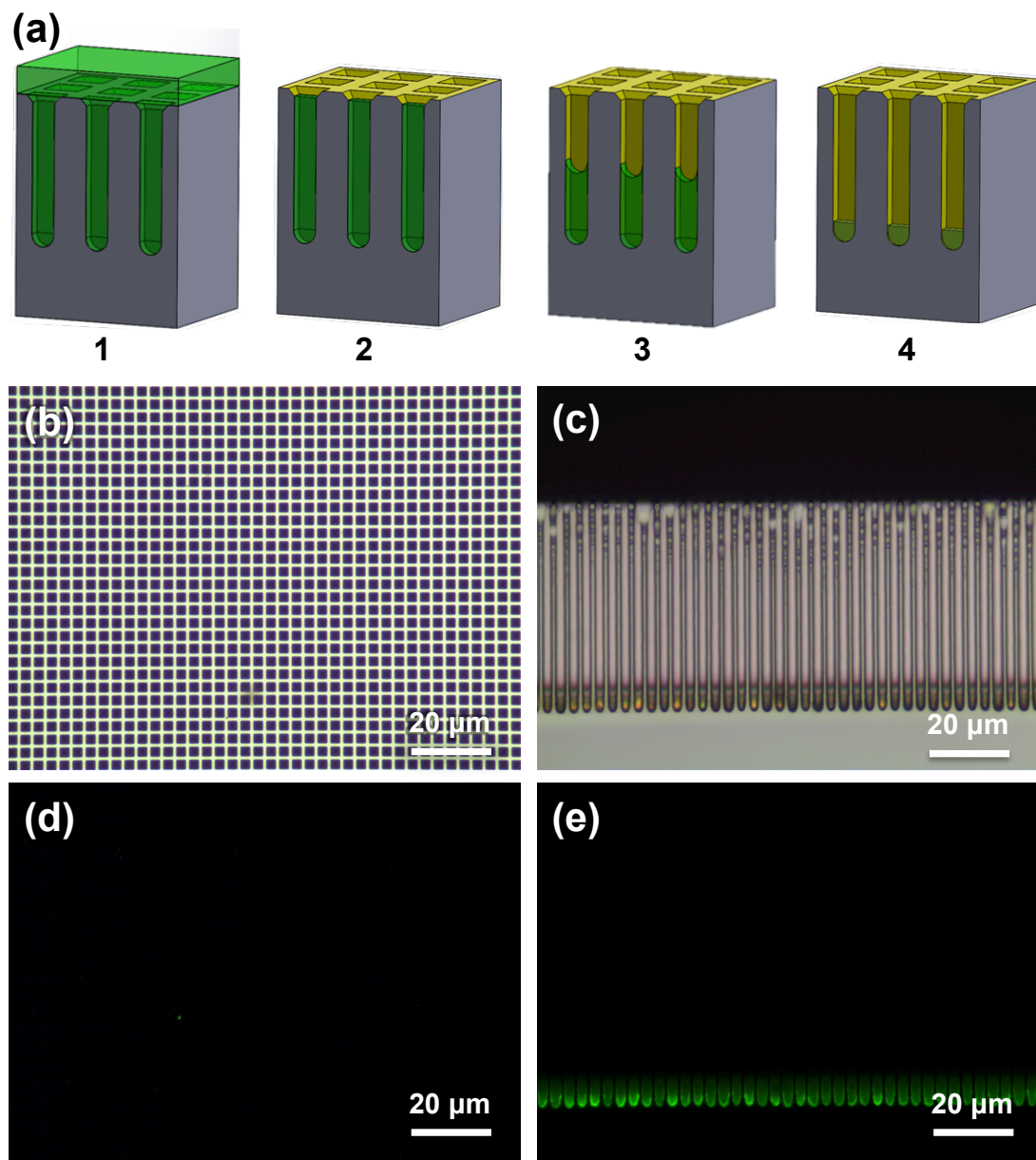
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**Figure S1. Fabrication of Arrays of Silicon Micropipes** (a) Sketch of the main technological steps for the fabrication of 2D arrays of both regular and non regular closed-ended (a-3), open-ended (a-4i), and open-ended pass-through (a-4ii) micropipes: (a-1) definition of the layout on the silicon dioxide layer by standard photolithography and subsequent BHF etching, (a-2) layout replication into the silicon surface by KOH etching, (a-3) anisotropic deep-etch of closed-ended micropipes by BIEE (used as negative control samples), either (a-4i) switching of the etching regime from anisotropic to isotropic in order to obtain open-ended micropipes connected at their bottom by a port-hole 2D mesh or (a-4ii) KOH silicon etch of the sample back-side through a square window in order to obtain open-ended pass-through micropipes (used as positive control samples). (b) SEM micrographs showing a top-view of bare silicon micropipe arrays used for the development of the technique. The different arrays feature hole size and

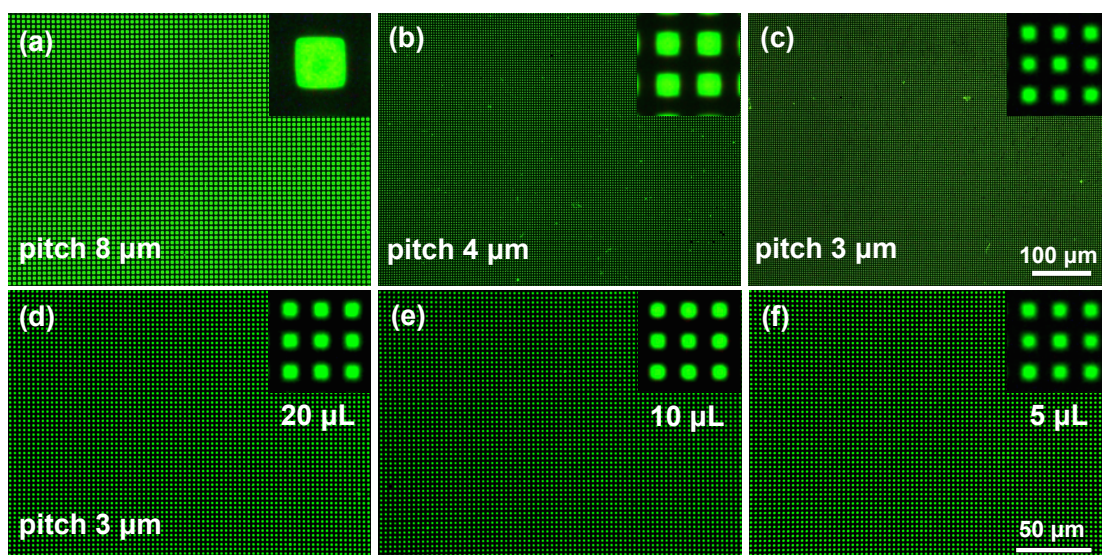
pitch of about (b-1)  $\sim 14 \mu\text{m}^2$  and  $8 \mu\text{m}$ , (b-2)  $\sim 4 \mu\text{m}^2$  and  $4 \mu\text{m}$ , (b-3)  $\sim 3 \mu\text{m}^2$  and  $3 \mu\text{m}$ , respectively.



**Figure S2. Closed-Ended Micropipes as Negative Control Samples** (a) Sketch showing polymer infiltration and solvent evaporation in closed-ended micropipes (negative control samples): (a-1) polymer filled closed-ended micropipes resulting from drop-casting deposition, (a-2) formation of a continuous polymer layer on top of the silicon microstructured template upon solvent evaporation from the solution on top of the microstructure, (a-3) flow menisci moving from top to bottom due to solvent evaporation, (a-4) thick polymer layer left at the bottom of closed-ended micropipes upon full solvent evaporation. (b, d) Bright-field (b) and fluorescence



(d) top-view optical images showing no membrane formation occurring after drop-casting deposition of 10  $\mu\text{L}$  of polymer solution with 1 wt% of F8BT onto a 2D array of closed-ended micropipes. (c, e) Bright-field (c) and fluorescence (e) optical images of a cross-section of the sample shown in (b, d) highlighting the thick polymer layer deposited at the bottom of closed-ended micropipes upon full solvent evaporation.



**Figure S3. Flexibility of the preparation of suspended polymer membranes** (a, b, c) Fluorescence images at 20 $\times$  showing a top-view of 2D lattices of suspended F8BT membranes obtained by drop-casting deposition of 10  $\mu\text{L}$  of polymer solution with 1 wt% F8BT onto silicon microstructured templates reported in Figure S1b-1, -2, and -3, respectively, with insets highlighting an area of  $10 \times 10 \mu\text{m}^2$  of each lattice. It is possible to appreciate the effectiveness of the technique over large-area arrays. (d, e, f) Fluorescence images showing typical top-views of 2D lattices of suspended F8BT membranes obtained by drop-casting deposition of 20  $\mu\text{L}$  (d), 10  $\mu\text{L}$  (e), and 5  $\mu\text{L}$  (f) of polymer solution with 1 wt% F8BT onto 2D open-ended micropipe arrays featuring pipe size of  $\sim 3 \mu\text{m}^2$ , and pitch of 3  $\mu\text{m}$ , with insets highlighting an area of  $10 \times 10 \mu\text{m}^2$  of each lattice. No evident differences were appreciable by optical and fluorescence microscopy in terms of yield and effectiveness of the method ascribable to the use of different volumes of drop-cast solution.